

## A New Genus, *Warlucephala*, for the Reception of *Deltocephalus arunda* Jacobi, 1909, and Two New Species (Hemiptera: Cicadellidae: Deltocephalinae)

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**ABSTRACT.** The new leafhopper genus *Warlucephala* is described based on *Deltocephalus arunda* Jacobi, 1909, from Western Australia and placed in the tribe Deltocephalini. *Warlucephala reversa* n.sp. from New South Wales and *Warlucephala abbreviata* n.sp. from southern Western Australia are also described. The affinities of the new genus are discussed.

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In his catalogue of the Australian leafhopper fauna, Evans (1966) listed 15 species of subfamily Deltocephalinae in the nominal genus *Deltocephalus* Burmeister but stated that a critical study of the world fauna was needed to determine if any of these were truly congeneric with the type species, *Deltocephalus pulicaris* Fallén. By 1994, when the next catalogue of the Australian fauna was published (Day & Fletcher, 1994), four of these had been transferred elsewhere: *D. taedius* Kirkaldy to *Arawa* Knight (Tribe Athysanini) as a *nomen dubium*, by Fletcher & Condello (1993), *D. montanus* Evans (preoccupied by *Deltocephalus montanus* Distant, replaced with *D. novellus* by Metcalf, 1968) to *Arawa* by Knight (1975), *D. dedarensis* Evans to *Euleimonios* Kirkaldy (Tribe Paralimnini) by Fletcher & Condello (1994) and *D. dorsalis* Motschulsky to *Recilia* Edwards (Tribe Deltocephalini) by Nielson (1968). In addition, Day & Fletcher (1994) transferred *Deltocephalus pullatus* Evans to *Limotettix* J. Sahlberg (tribe Athysanini) as a senior synonym of *Limotettix condylus* Knight.

Of the remaining 10 species listed in *Deltocephalus* by Day & Fletcher (1994), six were moved into other genera by Fletcher (2004), *D. lotis* Kirkaldy, *D. aristarche* (Kirkaldy) and *D. perparvus* Kirkaldy to *Horouta* Knight (Tribe Deltocephalini), *D. polemon* Kirkaldy to *Micrelloides*

Evans (Tribe Paralimnini) and *D. decoloratus* Evans and *D. centralis* Evans to *Arawa*.

In this paper, one of the remaining four species is transferred to *Warlucephalus* n.gen. and two additional new species are added to the genus. This leaves *D. chlorippe* (Kirkaldy), *D. lucindae* Kirkaldy and *D. viridellus* Evans still to be placed outside *Deltocephalus* should this prove necessary.

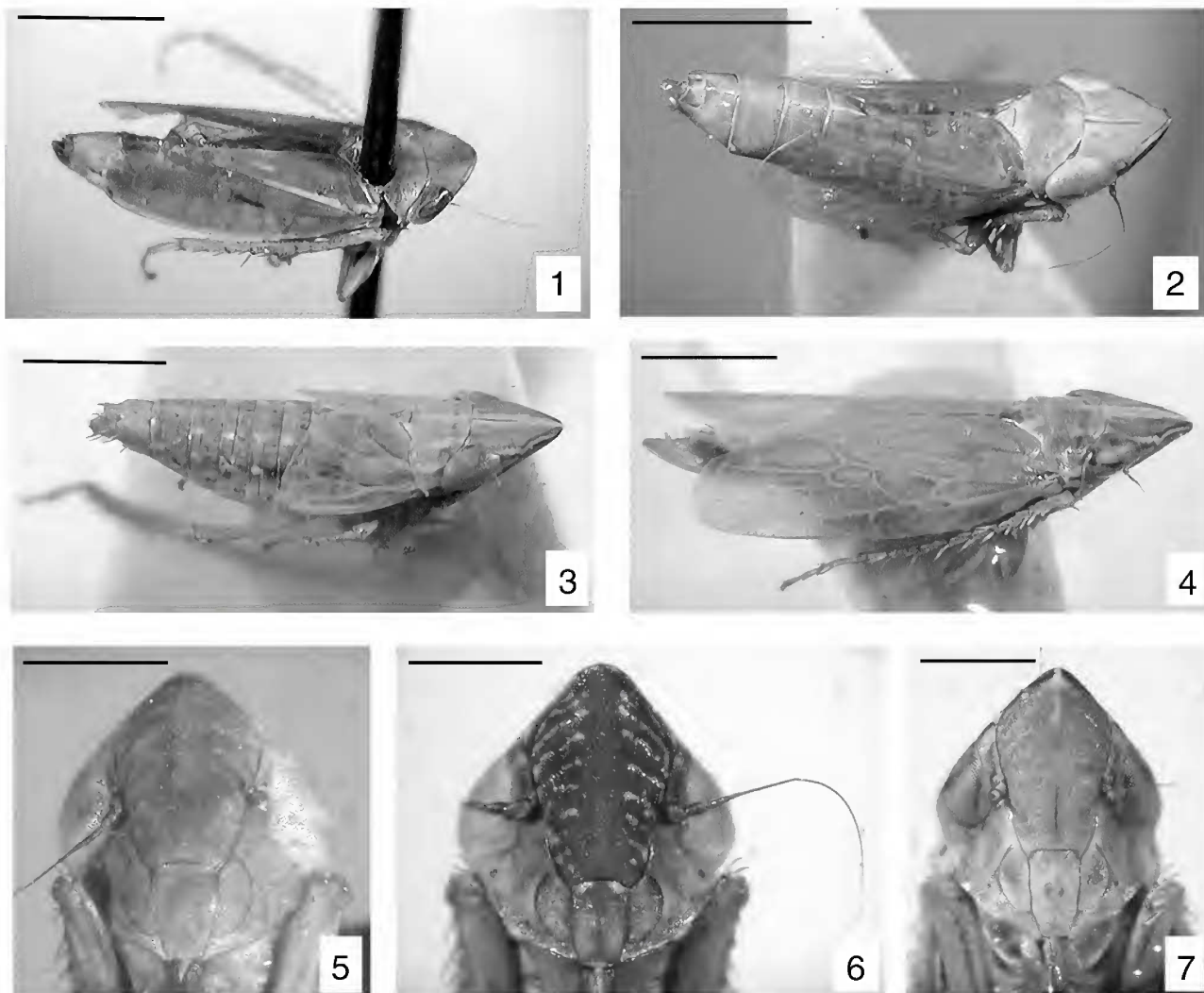
The following abbreviations are used in this paper: AM: Australian Museum, Sydney; ASCU: Agricultural Scientific Collections Unit, NSW Department of Primary Industries, Orange; NSW: New South Wales; WA: Western Australia.

### Genus *Warlucephala* n.gen.

**Type species.** *Deltocephalus arunda* Jacobi 1909: 343.

**Etymology.** The generic name, which is feminine, combines flat plain (*warlu*: Nyungar language of northwestern Australia) (Thieburger & McGregor, 1994) with head (*cephalus*, Latin).

**Diagnosis.** *Head.* Head flat dorsally, convex on face with frontoclypeus large, anteclypeus parallel-sided or tapered to level with lora, then narrowed to apex. Vertex arrow-shaped with longitudinal median furrow around distinct coronal suture which extends from base to around three



Figs. 1–7. Habitus of (1) *Warlucephala arunda*, lectotype female; (2) *W. reversa*, paratype male; (3) *W. abbreviata*, holotype male; and (4) *W. abbreviata*, macropterous female paratype; scale lines = 1 mm. Facial views of heads of (5) *Warlucephala arunda*; (6) *W. reversa*; and (7) *W. abbreviata*; scale lines = 0.5 mm.

quarters length of vertex. Vertex meeting face at acute angle, sometimes marginally carinate over median section. *Tegmina*. Tegmina fully brachypterous, semi-brachypterous or macropterous. *Male genitalia*. Pygofer extended posteriorly as rounded lobe bearing macrosetae. Subgenital plates narrow triangular to elongate, bearing row of macrosetae on outer margins. Parameres modified with apical process rounded, not pointed. Aedeagus simple tubular, without processes other than apical extension of various form beyond gonopore.

**Distribution.** Southern Western Australia and New South Wales.

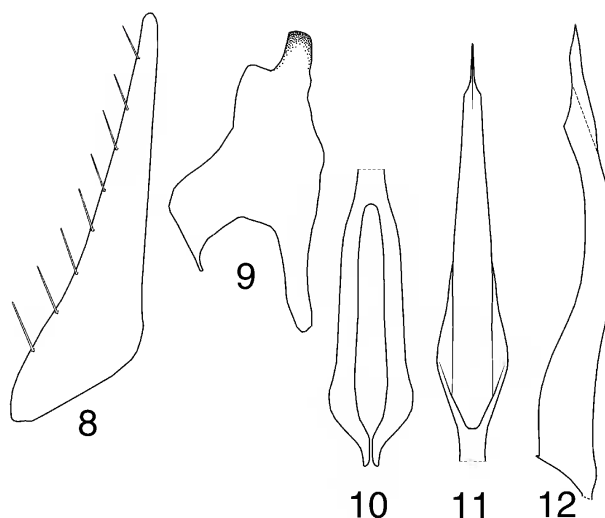
***Warlucephala arunda* (Jacobi), n.comb.**

Figs. 1, 5, 8–12

*Deltocephalus arunda* Jacobi 1909: 343.

**Types.** Lectotype ♀ (here designated), Moora, Western Australia 8.viii.1905 (Berlin); paralectotype, ♀, same data as lectotype (?Hamburg).

**Material examined.** Lectotype and the following: Western Australia: 3 ♂♂, Perth, ii.1961, light trap (AM).



Figs. 8–12. Male genitalia of *Warlucephala arunda*: (8) subgenital plate; (9) paramere; (10) connective; (11) aedeagus, posteroventral view; (12) aedeagus, lateral view.

**Description.** *Length:* Male 2.8–2.9 mm. *Coloration:* Pale yellow brown on vertex, thorax and abdomen. Face (Fig. 5) dark brown with transverse pale striations on frontoclypeus, separated from vertex by two transverse dark brown lines which are slightly convex around dorsal edge of frontoclypeus. Tegmina translucent brown, paler along costal margin. *Morphology:* Anteclypeus broad at base, tapering unevenly towards apex, noticeably narrowing beyond lora which are widely separated from face margin. Vertex arrow-shaped, flat to concave on disc with clearly distinct median carina reaching three quarters from base to apex. Pronotum short. Tegmen reaching to just short of base of tenth abdominal tergite, appendix absent. *Male genitalia:* Pygofer extended posteriorly and apically rounded, bearing group of macrosetae on posterior lobe. Subgenital plates (Fig. 8) narrowly triangular, posteriorly extended to level with pygofer, apically bluntly pointed, each bearing 6–8 macrosetae evenly spaced along outer margin which is slightly concave. Paramere (Fig. 9) short, apical process reduced, bluntly rounded apically, preapical shoulder rounded. Connective (Fig. 10) fused with base of aedeagus, with lateral arms longer than main body. Aedeagus (Figs. 11–12) tubular, lightly evenly curved dorsally with gonopore apical but with shaft extended to form short, straight, linear process directed posteriorly from ventral margin of gonopore.

**Distribution.** Western Australia.

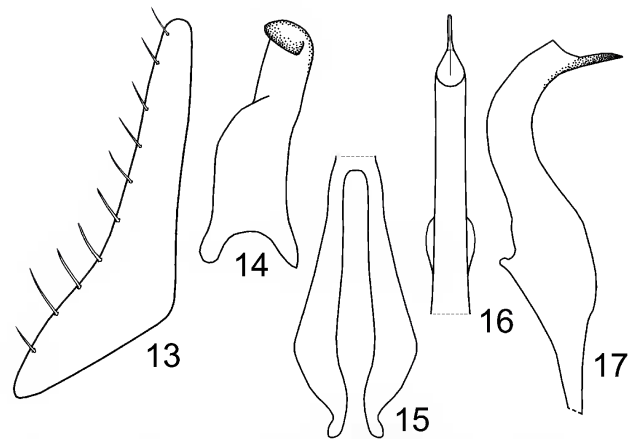
**Remarks.** The presence of a paralectotype female in Hamburg has not been confirmed. A lectotype is designated to provide a reference for the species. The three males listed above were found in the J.W. Evans Collection and appear to have been collected by Evans, because the associated data labels appear to be in his handwriting.

#### *Warlucephala reversa* n.sp.

Figs. 2, 6, 13–17

**Type material.** HOLOTYPE ♂, Mt Kosciusko [sic], Wilson's Valley, NSW, i.1965, J.W. & F. Evans, AM K204207. PARATYPES: New South Wales: 2 ♂♂, 1 ♀, 1 unknown (lacking abdomen), same data as holotype (1 ♂, 1 unknown ASCU, others AM K204208, AM K204209).

**Description.** *Length.* Male (n=3) 3.5–3.7 mm, female (n=1) 4.3 mm. *Coloration:* Pale brown dorsally, darker ventrally. Frontoclypeus (Fig. 6) dark brown with speckled lateral pale striations. Apex of head with fine dark brown marginal line, slightly convex dorsally around margin of frontoclypeus. Tegmina translucent testaceous with pale band along costal margin. *Morphology:* Anteclypeus parallel-sided to apex of lora, then narrowed to apex. Lora widely separated from face margin. Vertex arrow-shaped, slightly longer medially than wide between eyes. Vertex shagreen, flat, medially slightly depressed with dark median suture reaching about 3 quarters length from base. Pronotum short, faintly transversely wrinkled. *Male genitalia.* Pygofer long, laterally extended to form rounded lobe bearing 8–9 long macrosetae. Subgenital plates (Fig. 13) elongate triangular, apically roundly pointed, bearing evenly spaced macrosetae on outer, slightly concave, margins. Paramere (Fig. 14) short, with apical process rounded and curled over apically. Preapical shoulder weakly rounded. Connective (Fig. 15)



Figs. 13–17. Male genitalia of *Warlucephala reversa*: (13) subgenital plate; (14) paramere; (15) connective; (16) aedeagus, posteroventral view; (17) aedeagus, lateral view.

with arms longer than main body. Aedeagus (Figs. 16, 17) tubular, strongly curved ventrally with apical linear extension beyond gonopore on ventral side of gonopore.

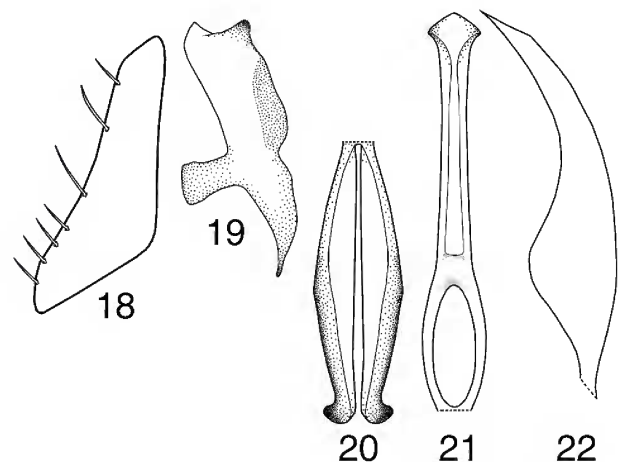
**Distribution.** Kosciusko region, New South Wales.

**Etymology.** The specific name refers to the curvature of the aedeagal shaft being in the reverse direction from that in other known species of the genus.

#### *Warlucephala abbreviata* n.sp.

Figs. 3, 4, 7, 18–22

**Type material.** HOLOTYPE: ♂, Albany, Western Australia, x.1966, J.W. & F. Evans, AM K204211. PARATYPES: Western Australia: 12 specimens, same data as holotype: 1 ♀ mounted with holotype; 1 ♀ and 1, sex unknown (abdomen missing), mounted together; 1 ♂ (head missing) and 1 ♀, mounted together; 1 ♀ (mounted with tarsal remnants of second specimen which is not included in type series); 4 ♀♀ mounted individually (all in AM K204212–K204218, seven registration numbers for 10 specimens, some double-mounted); 1 ♂, 1 ♀ mounted individually (ASCU).



Figs. 18–22. Male genitalia of *Warlucephala abbreviata*: (18) subgenital plate; (19) paramere; (20) connective; (21) aedeagus, posteroventral view; (22) aedeagus, lateral view.



**Description.** *Size.* Brachypterous male (Fig. 3) (n=2) 3.2–3.4, brachypterous female (n=7) 4.0–4.3 mm, macropterous female (Fig. 4) (n=2) 4.2 mm. *Coloration:* Pale coffee brown. Face (Fig. 7) slightly darker toward margin with vertex, with faint pale lateral striping and short median pale band. Margin between face and vertex marked with cream band bordered on both sides with dark brown, this band convex laterally to reveal narrowly part of frontoclypeus when viewed dorsally. Vertex pale coffee with pale cream median stripe which continues less distinctly onto pronotum which also bears vague stripes laterally parallel to median. Tegmina pale translucent testaceous in brachypters, darker in cells of macropter. *Morphology:* Anteclypeus tapering base to apex, more strongly narrowed beyond lora which are widely separated from face margin. Vertex triangular, slightly convex, longer than wide between eyes, shagreen. pronotum short, obscurely transversely wrinkled. Tegmina short quadrate in brachypters, reaching to apex of abdomen in macropter which has appendix extending around apex of tegmen, apical cells long so that preapical cells are situated at around midlength of tegmen. First preapical cell short, rounded, third closed basally. *Male genitalia:* Pygofer of medium length, apically extended with rounded lobe bearing numerous macrosetae. Subgenital plates (Fig. 18) triangular, not nearly reaching as far posteriorly as pygofer with evenly spaced short macrosetae on concave outer margins. Parameres (Fig. 19) dark, short, broad, flattened, apically truncate to excavate. Connective (Fig. 20) with arms longer than main body. Aedeagus (Figs. 21, 22) with shaft evenly curved dorsally, tapered base to apex but slightly expanded apically with flange around gonopore.

**Distribution.** South Western Australia.

**Etymology.** The specific name refers to the strongly brachypterous tegmina found in most specimens.

**Remarks.** This species is more highly decorated than the other described species and is immediately recognisable by the markings on the vertex. The presence in the type series of a macropterous female indicates that polymorphism might also be a feature of other species of the genus.

### Discussion

The placement of *Warlucephala* in Deldocephalini is based on the features used by Knight (1975) to define that tribe. These are the parallel arms of the aedeagal connective which is fused to the base of the aedeagus and the width of the genital strip below the lora. The new genus shows affinities with *Recilia* Edwards based on head structure, tegmen venation (as found in macropterous forms) and the simple, curved, tubular aedeagus with linear extension beyond the gonopore. It differs from *Recilia* in other features of the male genitalia, particularly the modified structure of the parameres, the occurrence of brachyptery, the flat vertex and the angulate margin between the vertex and the face.

*Warlucephala* has a Bassian distribution between the southwestern and southeastern portions of the Australian mainland. This contrasts with *Recilia* which is an Oriental genus distributed, within Australia, across the tropics with extensions into coastal temperate zones.

Brachyptery is common in Australian Deldocephalini with

species of *Horouta* Knight and *Stenogiffardia parvula* (Kirkaldy) occurring commonly in brachypterous, semi-brachypterous or macropterous forms. Knight (1975) discussed the occurrence of brachyptery in *Horouta*, indicating that this form was normally restricted to the females and was typical of populations from higher altitudes. Fletcher (2004) demonstrated that brachyptery was common in both males and females. Males of *W. abbreviata* are only known in the brachypterous form and females in both forms while both males and females of *W. reversa* are semi-brachypterous. Although *W. reversa* is described above from the higher altitudes of the Kosciuszko region of NSW, *W. abbreviata* is only known at the low altitude of Albany, WA. Correlation between occurrence of brachyptery and higher altitudes therefore seems unlikely.

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